STATE OF CALIFORNIA—STATE AND CONSUMER SERVICES AGENCY PETE WILSON, *Governor*

DEPARTMENT OF GENERAL SERVICES

**TELECOMMUNICATIONS DIVISION**

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October 18, 1996



Mr. William F. Caton, Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554-0001

Dear Mr. Caton:

The State of California, Department of General Services, Telecommunications Division herein submits comments in the matter of WT Docket 96-86. In accordance with Commission requirements, enclosed are the original and nine copies of our comments.

Sincerely,

Pete Wanzenried

PETE WANZENRIED
Acting Deputy Director

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Enclosures

Before the
**FEDERAL COMMUNICATIONS COMMISSION**
Washington, DC 20554

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| In the matter of | ) | |
| | ) | |
| The Development of Operational, | ) | |
| Technical, and Spectrum Requirements | ) | WT Docket 96-86 |
| for Meeting Federal, State, and Local | ) | |
| Public Safety Agency Communication | ) | |
| Requirements Through the Year 2010 | ) | |

To: The Commission

Comments of
The California Department of General Services
Telecommunications Division

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## I. INTRODUCTION

The California Department of General Services, Telecommunications Division (Division) is the primary agency responsible for the design, installation, and maintenance of land mobile radio communications systems used by the various state public safety agencies. The Division also is responsible for Federal Communications Commission licensing of all radio stations used by state agencies and for spectrum management. The Division has been an active participant in the Public Safety Wireless Advisory Committee (PSWAC) process.

## II. EXECUTIVE SUMMARY

The Division fully supports the efforts of the Public Safety Wireless Advisory Committee and requests the Commission move expeditiously to provide the desperately needed spectrum identified in the Committee report. The Division specifically endorses the definitions for "public safety" and "interoperability" and recommends the Commission adopt those definitions for future actions. The Division recommends the Commission avoid setting specific standards for the design and operation of public safety as the specific needs of various agencies is too diverse and the conditions under which public safety communications must operate is too situational. However, the Division notes that interoperability between and amongst public safety agencies demands that certain standards be defined for the interoperability mode of operation. The

Division further recommends that the Commission consider the need for wide area communication systems when making its spectrum allocation decisions. The Division concurs with the analysis in the PSWAC Report which identified that only about 10% of public safety communication needs could be satisfied by commercial providers. Finally, the Division believes the current marketplace for public safety communications goods and services is healthy.

## III. SUPPORT FOR OTHER FILINGS

The Division fully supports the findings and recommendations contained in the PSWAC report as well as the findings and recommendations contained in each of the subcommittee reports. The Division strongly urges the Commission to adopt the PSWAC recommendations and take immediate action to provide the 97.5 MHz[1] of spectrum identified as being critical to satisfying the land mobile communications needs of the public safety community through the year 2010.

The Division also fully supports the comments submitted by the Association of Public Safety Communications Officials-International, Inc. (APCO)

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[1] The PSWAC Final Report recommends 2.5 MHz of spectrum be identified immediately for inter-operability purposes, 25 MHz of spectrum be identified for use within the next 5 years and 70 MHz of spectrum be identified for use in the 5-15 year timeframe.

and the Northern California Chapter of the Association of Public Safety Communications Officials-International, Inc.

## IV. SPECIFIC COMMENTS

Land mobile communication systems provide a vital link in the provision of public safety services to the American public. The radio carried by our police officers, fire personnel, and emergency medical providers is amongst the most essential tools they carry. It is the method by which they receive assignments, obtain information, and call for help. A unit with a defective radio is considered to be out-of-service. Let interference begin on a radio channel and it is not long before cries of "officer safety" are ringing through the halls. Public safety personnel absolutely must have reliable and effective communications.

There is a tremendous pent-up demand for additional communications capability throughout the country. Increases in the numbers of public safety personnel and advances in technology have combined to greatly increase the demand for additional spectrum to support land mobile communications. In some parts of the country, all of the available spectrum is currently in use and there are additional needs which are going unmet. As an example, UHF TV channel 16 (482-488 MHz) was made available for public safety use in the Los Angeles area followed shortly by the 821-824/866-869 MHz allocation. As

quickly as this new spectrum became available, it was consumed. Today, there is virtually no spectrum available in the Los Angeles area to meet the demand for additional services.

The Division requests the Commission consider identifying some of the new spectrum for use in wide area systems. State agencies have a need to move personnel and equipment from one area of the state to another in response to changing conditions. These movements may be in response to seasonal shifts in workload or to emergent situations such as fires, floods, civil disturbances, and natural disasters. Regardless of the reason for the movement, the personnel and equipment must be capable of operating in the new area shortly after arrival. State agencies also must be capable of operating in all parts of the state. In some cases, a single unit may roam across several hundred square miles of area during a single shift. Not only must the communications system operate over this entire area, but the user should be able to utilize a single radio (preferably a single channel) throughout the area. Thus, state agencies need access to radio spectrum which is common throughout the state and which has good propagation characteristics. Given a choice, the Division would prefer to have a block of spectrum made available in the 138-216 MHz band for use in wide area radio systems.

A. Public Safety and Interoperability Definitions

The Division endorses the definitions for "public safety", "public safety services", "public safety services provider", "public safety support provider", and "public services" as identified in the PSWAC report. The Division believes these definitions properly distinguish between governmental entities which provide essential services to the community and investor-owned companies which may provide similar services.

The Division endorses the definition for "interoperability" contained in the PSWAC report and emphasizes the importance of interoperability to state operations. The Commission has appropriately identified the need for interoperability in paragraphs 28-30 of the docket. For state agencies, the difference between day-to-day operations, as described in paragraph 28, and mutual aid operations, as described in paragraph 29, is little more than a matter of scope.

B. Interoperability Issues

There is no easy answer on how best to provide for interoperability. If we could start over, a large contiguous frequency band for all public safety operations would be ideal. But we cannot start over, we must consider the embedded base of equipment and the myriad of current other uses of the radio

spectrum. The reality is, the only two blocks of spectrum which are large enough to accommodate public safety's total spectrum requirements and which exhibit good propagation characteristics are already occupied by the military and by the television broadcasters. Thus, moving all of public safety communications to a single band is not even worthy of consideration.

The use of multi-mode radios is not significantly different from the current practice of using multiple radios to provide interoperability. A single multi-mode radio may be slightly cheaper than purchasing two or more single mode radios but may not offer desirable operational characteristics. For instance, simultaneous monitoring of an agency's primary radio channel while operating on another agency's channel in the interoperability mode may not be possible with a multi-mode radio while it is possible for multiple radios. Thus, multi-mode radios may be more expensive (as compared to a single mode radio) and present undesirable characteristics which result in an agency having to purchase two or more multi-mode radios as opposed to two or more single mode radios.

Cross-band repeating and/or gateways between systems has been used by state agencies with mixed success. The main difficulty lies in the complexity of the inter-tie between systems and differences in the operation of the systems involved in the inter-tie. Simple things like a difference in the coverage of one

system as opposed to the other systems present severe operational problems. The availability of the inter-tie/gateway may present another problem. Is it available all of the time, which might be spectrum inefficient, or does it have to be "set-up" each time it is needed? If it has to be "set-up", how long does it take to set-up and how easy is it? These are not insurmountable problems, but they may deter an agency from making effective use of the inter-tie/gateway.

The Division believes the PSWAC proposal for 2.5 MHz of new spectrum for interoperability offers a reasonable solution to the problem. This spectrum will provide a single place for interoperability to occur. Regardless of where this spectrum is located, each agency will need at most one additional radio in order to operate in the interoperable mode (as opposed to needing three or more additional radios to operate in each of the current frequency bands). The Division further believes that the number of channels and use of those channels as identified in the PSWAC report is essential to an effective interoperability capability. Therefore, the Division recommends that the full 2.5 MHz of spectrum be immediately identified, cleared, and designated for public safety interoperability purposes. The Division further recommends that the Commission NOT make operation on the interoperability band a condition of Type Acceptance. The Division believes that individual users should be allowed to decide whether or not they implement the interoperability capability (although it

hopes that most agencies will) and that individual users should be allowed to decide whether a single multi-mode radio or multiple single-mode radios is the best way to implement the interoperability capability while maintaining their routine operational capability.

The Division does believe the Commission needs to establish standards for operation in the interoperability band. Currently, almost every radio offered in the public safety market is capable of operating in an analog FM mode using a 25 kHz channel. The notable exception to this statement are the single sideband radios operating in the 220 MHz band (although there are very few, if any, public safety radio systems in this band). As public safety systems evolve into the future, there will be a general migration to digital voice systems and an increased use of data communications. Currently, there is no universal standard comparable to analog FM for these digital systems. APCO Project 25 has attempted to set such a standard, but there has been considerable objection raised by companies wanting to market other products. By its very nature, interoperability requires that one radio be capable of talking to another radio whether that other radio be of the same or different manufacturer and whether that other radio be a part of the same or different radio system. The Commission must mandate a common mode of operation in the interoperability band for interoperability to become a reality. The Interoperability Subcommittee of the

PSWAC tried to address this issue and ran into the same proprietary interests as APCO Project 25. While the Interoperability Subcommittee recommended analog FM, that recommendation was predicated on the fact there is a tremendous embedded base which must be considered when recommending a mode of operation for **today**. If operation in the interoperability band is to move forward toward digital transmission, there must be a vision of what the mode of operation will be **tomorrow**---that vision is a standard towards which all systems are migrating. Furthermore, depending upon where in the spectrum the new Interoperability Band is placed, it is conceivable that new radios would be required for all agencies wishing to operate in that band. In this situation, operation in the new Interoperability Band could be defined by the new standard without regard to protecting operation in the old analog FM mode.

C. Operational Issues

The optimal design and operation of a public safety communications system varies widely from agency to agency. Even within state government, the optimal frequency selection and design of a radio system for the campus-like environment of a state prison is much different from the optimal frequency selection and system design for the heavily forested environment of a state park or the wide open environment of a highway through the Mojave Desert. There is no single frequency band which is best, there is no system design which is

universally applicable. There is no utopian solution to providing land mobile communications. Nonetheless, the Division sees certain trends which the Commission should recognize. First, the increased use of repeater systems, either trunked or conventional. This trend mandates that all new spectrum be allocated in designated pairs, such as those found in the UHF and 800-MHz bands. The lack of channel pairing in the VHF low band and high band has placed a severe limitation on the effective use of those bands. This has been a particular problem wherein one agency uses a given frequency as the input to a repeater system while another agency uses it as the output. In this situation, destructive interference may occur over distances of 100 miles or more. Second, a combination of increasing noise problems in the VHF low band and the limited availability of features in VHF low band equipment has pushed many users to migrate to higher frequency bands. Because there is less demand for VHF low band products, the manufacturers have put off additional product development and, in some cases, have discontinued product lines. With fewer products in the marketplace, additional users are forced to seek other alternatives to satisfy their communication needs. This downward spiral has reached the point that none of the major manufacturers offers infrastructure equipment and very few manufacturers offer subscriber equipment (mobiles and hand helds). For agencies like the California Highway Patrol, which operates at 42 MHz, the continued viability of their entire communications system is at risk.

If the Highway Patrol is unable to obtain needed equipment for replacement and expansion of their radio system, they will be forced to seek other spectrum. Unfortunately, there is no spectrum currently available throughout California which can satisfy their needs. The Commission needs to either provide incentives for continued use of this band or establish a plan for all users to migrate to some other spectrum.

The Division concurs with the listing of new service features identified in paragraph 48. While some of these new service features will have an impact on current service features, they will not replace the current features. The features listed in paragraph 48 are not new and revolutionary, in fact, they are features already provided on a variety of private and commercial systems. The fact that these features have not been widely implemented on public safety systems is not the result of a lack of need or a lack of foresight, but rather a lack of adequate spectrum. In the past, the Commission has been very generous in granting private companies large blocks of spectrum to develop speculative services while it has been very frugal in allocating spectrum for identified public safety needs. The time has come for the Commission to look seriously at the needs of public safety and allocate the appropriate spectrum.

The Division does not concur with the Commission's apparent conclusion that shared systems, particularly trunked radio systems, are any better than single user systems. The critical factor is whether the system is properly designed to meet the justifiable needs of the using agency. A single user system which is fully loaded cannot be made more efficient by adding another user. A single user system with a limited coverage area may not become more efficient if adding another user also requires increasing the coverage area. The Commission should be very careful in trying to compare the design and operation of public safety communication systems with those in the commercial world. There are significant differences in the way these types of systems are used and how critical good communications are to the operation of the user group. Public safety users are implementing trunking---where it is appropriate. Public safety users have entered into agreements to build shared radio systems. Some of those agreements have worked and others have not. Quite frankly, the politics of sharing a system becomes the deciding factor in its downfall, not any technical issue. Individual users must be allowed to decide what is best for their own agency. On the surface, sharing of infrastructure may appear to reduce the cost of a radio system. But, if use of that shared infrastructure requires subscriber units to have capabilities and features which are more expensive, then the overall cost of the system may actually increase. What if one user wants features and capabilities that the other user does not need? Who decides

which agencies should share systems and which agencies will be allowed to operate their own systems? When carried to its ultimate end, the argument for shared radio systems being better than single user radio systems would lead to a single ubiquitous nationwide radio system which is used by all public safety users, at all levels of government use, as being the best system possible. If this is not practical, where do we draw the line to establish any sort of policy which is practical?

D. *Technology Issues*

Other than establishing a standard for operation in the proposed new interoperability band, the Division opposes selection of any of the technologies listed (TDMA, CDMA, FDMA, or ACSSB) for future system design. The Division believes the stated improvements in spectral efficiency are theoretical and not supported by any system currently in operation. While the Division is aware of certain Specialized Mobile Radio licensees who have installed six-slot TDMA systems, those same SMR licensees have experienced severe operational problems in making those systems work in the real world of land mobile radio. We have been an active participant in the APCO Project 25 process and believe its FDMA approach has the widest applicability to public safety systems. However, we also see certain applications in which the 2-slot F-TDMA approach proposed by Ericsson, Inc. may be advantageous. Therefore, we believe the

rules should allow individual users to choose and implement technologies which best suit their individual needs.

The Division further believes that antenna patterns and station power limitations, i.e. system design, should be tailored to meet the justifiable operational needs of the user. We find nothing in the real world, however, which would support the Commission's conclusion that use of sectored antennas will improve system capacity by a factor of three or any other number. Furthermore, the use of sectored antenna towers will have zero impact on the number of antenna towers constructed. The entire discussion in paragraph 64 is a misguided and invalid comparison of public safety communication systems to a cellular telephone system.

As previously stated, the Division believes the Commission must establish standards for operation of public safety radios on interoperability channels. Without such standards, there is no interoperability. A TDMA radio cannot talk to a FDMA radio, an ACSSB radio, nor any radio using any different technology. A 2-slot TDMA radio, for that matter, cannot talk to a 6-slot TDMA radio. Any difference in the over-the-air data rate or the structure of the digital message for two digital radios will result in a non-communication. Any difference in the operation of the vocoder of a digital radio or in the error correction algorithm will

result in a non-communication. Toward this end, the Division strongly supports adoption of the APCO Project 25 Phase I standard as the designated mode of operation on the interoperability channels. Despite the controversy surrounding its development, the fact of the matter is the standard has been developed in an open and fair process which involved the participation of a very wide number of users and manufacturers, including its detractors. In general, decisions have been made within the context of the Telecommunications Industry Association which is a recognized standards setting entity.

Beyond the needs for interoperability, the Division believes the Commission rules should provide the maximum flexibility for individual system design while maintaining reasonable control over the spectrum.

E. Spectrum Allocation

The Division concurs that the existing spectrum allocations for public safety use are highly fragmented and while it would be very desirable to consolidate those allocations to some degree, we see little opportunity to do so. Furthermore, while we agree that mobile operations are possible up to frequencies of 2.5 GHz, practically speaking, land mobile radio systems for public safety use need to operate on frequencies below 800 MHz. This is largely due to propagation characteristics. Compared to the cellular type operations

proposed for PCS operations near 2 GHz, public safety communication systems need to operate over a wide area. This is partly due to the density of users, PCS estimates a much higher user density factor than is realistic for public safety users and partly due to the type of use, PCS will be more of a one-to-one type of service as opposed to the one-to-many type of service found in public safety.

For the past two years, the Division in association with the ten largest state agencies who use land mobile radios has been evaluating future needs for land mobile communications. One of the preliminary conclusions of this study is that the involved agencies could share in one or two statewide radio systems. A big stumbling block, however, is the lack of adequate spectrum to build a system which would satisfy their current needs let alone allow for future growth and new technologies. Even with all state agencies combined into a single system, the per square mile density of state users would be relatively low. Since the system must cover virtually the entire state, to be economical, each site in the system must cover a reasonably wide area. For this reason, the Division would like to see an allocation of spectrum in the 138-216 MHz portion of the band as providing optimal propagation characteristics. An allocation in the 400-512 MHz portion of the spectrum would be usable, but more costly to implement. Based upon current experiences with 800 MHz systems, a statewide system operating at or near 800 MHz would not be economical and, in fact, impractical to

implement along the North Coast area where heavy foliage combined with frequent fog conditions impede propagation. For this reason, the Division sees little hope that proposed spectrum allocations from TV Channels 60-69 will provide any relief to its operation. This is not to say that such allocations would not be useful to public safety at large, only that such allocations would not solve the wide area communication needs of state agencies.

The Division is particularly concerned that the most likely source of spectrum in the 138-216 MHz and 400-512 MHz bands is spectrum currently allocated to television broadcast services. The Division has reviewed the recent Commission action in the matter of MM Docket Number 88-268 and notes the allocation tables make heavy use of these bands, thereby giving the appearance of eliminating any possibility for additional public safety spectrum in these bands. The Division further notes that six of the ten channels between TV Channel 60 and TV Channel 69 have been allocated for television broadcast services, thereby making even those channels of little use.

The Division is concerned that the need for additional point-to-point microwave spectrum, although identified in the Sub-committee reports, was omitted from the PSWAC Report. Point-to-point microwave services provide vital links in the operation of public safety communication systems. Recent

Commission action to reallocate portions of the point-to-point microwave spectrum for other purposes[2] has had a significant impact upon our ability to modify and expand microwave systems to support the land mobile radios used by public safety agencies.

F. Transition Issues

All state agencies currently use commercial services for some or all of their communication needs. These services are used wherever they are available, are cost effective, and satisfy mission requirements. However, this is a small portion of the overall need[3]. Commercial providers have a particular problem in providing coverage throughout the state. While many commercial providers offer service in Los Angeles and San Francisco, few offer service in Bishop or Alturas or Eureka. As ubiquitous as everyone thinks cellular service is, there are large areas in California which do not have cellular service and, according to the cellular companies, never will. The need for truly statewide service cannot be overstated. Each year, the California Department of Forestry and Fire Protection moves thousands of fire fighters from one fire to another. Wildland fires occur each year within the Los Angeles city limits and in the most

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[2] The 12 GHz band was re-allocated to Direct Broadcast Satellite Services several years ago and just recently the 2 GHz band was re-allocated to PCS Services.

[3] The PSWAC Report identified that approximately 10% of public safety communications needs could be satisfied by commercial services.

remote portions of the state. The California Highway Patrol moves officers to handle the traffic and crowds at the Rose Parade in Pasadena (located near downtown Los Angeles) and at the Calaveras Frog Jump in Angels Camp (located in the foothills east of Stockton). The Department of Transportation moves men and equipment from the San Francisco Bay Area to the high Sierra mountains for snow removal operations. State agencies need radio communication systems which allow them to go anywhere in the state, on short notice and be functional when they get there. Currently, no commercial provider in California offers anywhere near this type of service. Sure, some providers claim to have made "roaming" arrangements with providers in other areas, but these arrangements are tenuous at best. During a recent attempt to obtain paging services for its employees throughout the state, the Division ended up entering into contracts with twelve different providers, each of whom operate in a portion of the state, but not all of it. Even so, there were several areas in which we could not obtain paging services. With the current demand for commercial services coming from the public and other commercial ventures, the commercial providers simply see no need to pursue the public safety market nor attempt to satisfy public safety's needs. Furthermore, in spite of the tremendous amount of spectrum the Commission has allocated to commercial providers over the past several years, they are not wallowing in spectrum (if they were, it would be easy to identify spectrum which could allocated to public safety). Commercial

providers also would need new allocations of spectrum to satisfy the public safety demand for service. What purpose would having some commercial entity serve as the middle man for public safety to gain new spectrum other than provide a mechanism for the Commission to auction the spectrum and for the commercial entity to make a profit, all at the expense of local government?

The Division does not agree with the Commission's conclusion that present spectrum allocation and administrative processes are inefficient and too lengthy. To the contrary, we often find our own funding cycles and implementation processes greatly exceed the time limits set by the Commission. The Division is quite satisfied with the current system of frequency coordinators assigned on a per-service basis with oversight and final review by the Commission. While the Division does process several requests for Special Temporary Authorization (STA) each year, these requests are for special events which are of a limited duration (such as 5 days for the Rose Parade). Even though many of these events occur year after year, they do not warrant issuance of a regular license.

G. Competition in the Supply of Goods and Services

The Division does not view the current competitiveness of the market for public safety communications goods and services as being a major deficiency.

While the current proprietary operation of trunking systems often locks an agency into a single vendor for add-on and replacement purchases, we are not heavily impacted by this because most of our radio systems are not trunked. To the contrary, we see much competition in the marketplace with many of the smaller manufacturers willing to provide special features and functions which the large manufacturers do not perceive as being worthwhile. The Division believes there has to be an identified baseline of performance which all manufacturers must meet. In the past, this baseline has been analog FM operating in the conventional mode on a 25 kHz channel. As we look to the future and the need for narrowband technologies, a new baseline standard of performance is needed. It is for this reason that the Division has participated in the APCO Project 25 effort and supports the suite of "standards" developed through that process. APCO Project 25 was formed with the intent and purpose of establishing a new baseline, before any manufacturer had a chance to develop and market a product which might become a de facto standard. Despite the objections of Ericsson, Inc., which apparently wants to continue the current proprietary practices of no competition in the after market for system expansion and replacement, APCO Project 25 has succeeded in developing a suite of "standards" which allow several manufacturers to bid not only on the initial installation, but also on later expansions/replacement of both infrastructure and subscriber elements. Contrary to Ericsson's assertion that the APCO Project 25

standard will limit competition, we already see evidence that it has increased competition. Not only have most of the traditional analog FM manufacturers stepped up to offer products, new manufacturers have entered into the field.

The Division does not believe Section 273 (d)(4) of the Communications Act of 1934 (as amended) is applicable to public safety equipment nor does it believe the Commission has the authority to impose such processes and procedures upon other organizations. The Commission might follow such processes and procedures in its own development of a standard or it might consider whether such processes and procedures had been reasonably followed before adopting some outside standard as its own, but only if such standard were to become a part of the rules and imposed upon all manufacturers and users.

## V. CONCLUSION

In conclusion, the Division commends the Commission for its interest in the future of public safety communications and thanks the Commission for taking a proactive stance in the PSWAC process. We respectfully request the Commission consider our comments as representing the interests of the entire public safety community at the state level within California. We ask the Commission to carefully consider the increased demand for public safety

spectrum and provide usable spectrum to satisfy our needs, particularly as applicable to wide area systems such as those used by state agencies.

Respectfully submitted,

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